Journal of Affective Disorders 207 (2017) 367–376

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Differential brain network activity across mood states in bipolar disorder

Roscoe O. Brady Jr.[a,b,c,*], Neeraj Tandon[a,c], Grace A. Masters[b,c], Allison Margolis[b,c], Bruce M. Cohen[c,d], Matcheri Keshavan[a,c], Dost Öngür[b,c]

[a] Department of Psychiatry, Beth Israel Deaconess Medical Center, Boston, MA, United States
[b] Psychotic Disorders Division, McLean Hospital, Belmont, MA, United States
[c] Department of Psychiatry, Harvard Medical School, Boston, MA, United States
[d] Program for Neuropsychiatric Research, McLean Hospital, Belmont, MA, United States

ARTICLE INFO

Keywords:
Bipolar
Mania
fMRI
Network
Imaging
Euthymia

ABSTRACT

Background: This study aimed to identify how the activity of large-scale brain networks differs between mood states in bipolar disorder. The authors measured spontaneous brain activity in subjects with bipolar disorder in mania and euthymia and compared these states to a healthy comparison population.

Methods: 23 subjects with bipolar disorder type I in a manic episode, 24 euthymic bipolar I subjects, and 23 matched healthy comparison (HC) subjects underwent resting state fMRI scans. Using an existing parcellation of the whole brain, we measured functional connectivity between brain regions and identified significant differences between groups.

Results: In unbiased whole-brain analyses, functional connectivity between parietal, occipital, and frontal nodes within the dorsal attention network (DAN) were significantly greater in mania than euthymia or HC subjects. In the default mode network (DMN), connectivity between dorsal frontal nodes and the rest of the DMN differentiated both mood state and diagnosis.

Limitations: The bipolar groups were separate cohorts rather than subjects imaged longitudinally across mood states.

Conclusions: Bipolar mood states are associated with highly significant alterations in connectivity in two large-scale brain networks. These same networks also differentiate bipolar mania and euthymia from a HC population. State related changes in DAN and DMN connectivity suggest a circuit based pathology underlying cognitive dysfunction as well as activity/reactivity in bipolar mania. Altered activities in neural networks may be biomarkers of bipolar disorder diagnosis and mood state that are accessible to neuromodulation and are promising novel targets for scientific investigation and possible clinical intervention.

1. Introduction

Bipolar disorder is a debilitating psychiatric disorder estimated to affect between 2% and 5% of the population (Merikangas et al., 2007). It may be instructive to examine the instability of neural activity in the varying mood states in bipolar disorder for clues into the mechanisms of specific mood states and the underlying physiology of bipolar disorder itself. A growing body of scientific inquiry has examined changes in neural activity associated with specific cognitive tasks such as emotion and reward processing (reviewed in Phillips and Swartz, (2014)); Strakowski et al.(2012). Drawing upon these findings from the primarily task-based fMRI literature, we recently examined the "resting state" (rsfMRI) functional connectivity of bipolar mania when compared to bipolar euthymia (Brady et al., 2016). That analysis examined functional connectivity to brain regions selected from a consensus model of the neurobiology of bipolar disorder (Strakowski et al., 2012). We observed mood state specific aberrant connectivity between the amygdala and brain regions implicated in emotion regulation even under rest (non-task) conditions.

We sought to complement our prior study of mood related connectivity of select cortical and subcortical regions with a more data-driven analysis of functional connectivity across the entire brain. The analysis of rsfMRI has demonstrated the presence of large-scale brain networks whose function is altered in psychiatric and neurologic diseases e.g. (Baker et al., 2014; Yeo et al., 2011; Zhou and Seeley, 2014). In bipolar disorder comparatively few studies have sought to examine whole brain measures of network activity and connectivity and there is a growing call to incorporate these studies into a bipolar imaging literature that has most often examined local networks (Chase and Phillips, 2016). Several recent studies have examined large scale

* Correspondence to: 75 Fenwood Road, Room 616, 02115 Boston, MA, United States.
E-mail address: robrady@bidmc.harvard.edu (R.O. Brady Jr.).

http://dx.doi.org/10.1016/j.jad.2016.09.041
Received 28 June 2016; Received in revised form 21 August 2016; Accepted 27 September 2016
Available online 06 October 2016
0165-0327/ © 2016 Elsevier B.V. All rights reserved.

Table 1
Detailed demographics, clinical, and medication information of the study population.

	Bipolar subjects (n=47) Demographics	Bipolar-manic subjects (n=23)	Bipolar-Euthymic subjects (n=24)	Healthy control subjects (n=23)	Statistic			
					Bipolar vs control	Control vs mania	Mania vs euthymia	Euthymia vs control
Age in years, mean (SD)	29.3 (11.5)	27.7 (11.1)	30.9 (11.9)	29.7 (10.9)	MW p=.527	MW p=.186	MW p=.076	MW p=.840
Sex					df=1 χ2=.003 p=.956	df=1 χ2=.107 p=.743	df=1 χ2=.295 p=.587	df=1 χ2=.045 p=.831
male	33	17	16	16				
female	14	6	8	7				
Clinical characteristics								
YMRS, mean (SD)	14.4 (13.3)	26.9 (5.70)	2.33 (3.40)	n/a			MW p < .001	
MADRS, mean (SD)	8.89 (7.02)	12.6 (6.60)	5.33 (5.46)	n/a			MW p < .001	
PANSS, mean (SD)	49.3 (14.3)	60.4 (10.3)	38.6 (8.11)	n/a			MW p < .001	
PANSS positive subscale, mean (SD)	15.9 (8.11)	22.7 (4.85)	9.33 (4.24)	n/a			MW p < .001	
Anticonvulsants	17/47	8/23	9/24	n/a			df=1 χ2=.038 p=.846	
Antipsychotics	37/47	22/23	15/24	n/a			df=1 χ2=7.07 p=.006	
CPZ equivalents, mean (SD)	254 (253)	370 (254)	143 (200)	n/a			MW p=.001	
Benzodiazepines	10/47	6/23	4/24	n/a			df=1 χ2=.622 p=.430	
Lithium	34/47	18/23	16/24	n/a			df=1 χ2=.789 p=.374	
Antidepressants	1/47	0/23	1/24	n/a			df=1 χ2=.979 p=.322	
framewise displacement in mm, mean (SD)	.136 (.058)	.140 (.066)	.133 (.051)	.121 (.071)	t(119) = 1.265 p=.208	t(73) = 1.218 p=.227	t(62)=.536 p=.594	t(84) =.918 p=.361

Abbreviations: MW: Mann-Whitney *U* Test, PANSS: Positive And Negative Symptom Scale, SD: Standard Deviation, YMRS: Young Mania Rating Scale.

Download English Version:

https://daneshyari.com/en/article/6229552

Download Persian Version:

https://daneshyari.com/article/6229552

Daneshyari.com